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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/045,810 | 01/11/2002 | Sedat Oelcer | CH920000087US1 | 2070 |

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IBM CORPORATION
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| EXAMINER | |
|---|---|
| FILE, ERIN M | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2634 | |

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/045,810 | SEDAT OELCER | |
| | Examiner | Art Unit | |
| | Erin M. File | 2634 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *11 January 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,8,9 and 16-18* is/are rejected.

7)☒ Claim(s) *3-7 and 10-14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/15/2002*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

**DETAILED ACTION**

***Specification***

1. The specification is objected to foe the following reasons:

- Pager 6 of the specification, line 15 refers to the information bits of figure 1 as 80, when they should correctly be referred to as 90.
- Throughout the specification the acronym QAM is used (see p. 6, lines 3, 18, p. 7, line 1, p. 8, line 16, etc.) without first a definition of this acronym. For example, in the first instance on p. 6 line 3, the full term followed by the acronym, Quadrature Amplitude Modulation (QAM), should be used.
- The recitation, "constellation (i.e., b is even)" (p. 8, line 17) is unclear as the term b has not yet been defined in the specification.

***Claim Objections***

2. Claims 2, 9 are objected to because of the following informalities: the use of the acronym LDPC. The acronym LDPC should be correctly defined as low-density parity-check. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 2, 8, 9 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ungerboeck and in further view of Cooklev.

**Claims 1, 2, 8, 9**, Ungerboeck discloses a multilevel channel coding technique is described which improves error performance of synchronous data links (abstract). Although Ungerboeck does not specifically use the term transmitter, the movement of data between data links, whether wireless or wired, some sort of transmitter is implied. In figure 4, Ungerboeck discloses a method of dividing a data set $A_0$ into a first subset $B_0$ and a second subset $B_1$. Each of the subsets are given short block code words to state the transitions of the structure (p. 57, III). Gray coding is used as a mapping function (p. 58, col. 1, paragraph 2). Ungerboeck fails to disclose the selecting of a symbol from within the subsets of encoded data, however, Cooklev discloses a new encoding method which builds upon the Trellis Coded Modulation (TCM) technique introduced by Ungerboeck for maximizing coding gains. This new design uses low-density parity-check (LDPC) coding as an encoding scheme. In figure 2, Cooklev discloses an encoder which input bits are divided into a first and second group. The first group is block encoded by FEC Encoder I and the second group of bits is block encoded by FEC Encoder II. The resulting block codes output from FEC encoders I and II are input to a coset selector which selects a subset of the signal constellation (p.1,

paragraph 2). The coset selector of figure 1 chooses a coset, or subset, inputs a subset into the signal point selector to select a code symbol for transmission. Cooklev discloses a motivation to replace TCM encoding with LDPC codes because LDPC codes are shown to have better performance when compared to convolutional codes. Therefore it would be obvious to one skilled in the art at the time of invention to incorporate Cooklev's disclosure into Ungerboeck's teaching.

**Claim 15**, inherits the limitations of Claim 8, further, the limitation of being connected to the information source for transmitting the set of the information bits is inherent in a transmitting device. Cooklev discloses input bits input the encoders, and it must be assumed that an information source of some sort is supplying the information bits of the input.

5. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ungerboeck and Cooklev and in further view of Morelos-Zaragoza et al.

**Claims 16-18**, inherit the limitations of Claims 1 and 8 respectively, neither Ungerboeck nor Cooklev disclose a program executable machine implantation of their inventions. However, Morelos-Zaragoza discloses a method and apparatus for multi-level encoding in which the components, processes, and/or data structures are implemented using computer software. Different implementations may be used and may include other types of programming languages, computing platforms, computer programs, firmware,

and/or machines (col. 6, lines 16-22). The use of executable program or software implementations of coding methodologies is common in the art because of the computationally efficient nature of these implementations and would therefore be obvious to one skilled in the art at the time of invention to incorporate software implementation of the encoding and transmission of Ungerboeck and Cooklev's combined apparatus.

***Claim Objections***

6. Claim 10 is objected to because of the following informalities: The recitation, "A method as claimed in Claim 8", however, Claim 8 is an apparatus claim and the claim should be changed to *An apparatus as claimed in Claim 8.* Appropriate correction is required.

7. Claims 3-7, 11-14 are objected to as they depend upon rejected claims, but would be allowable if rewritten in independent form.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erin M. File whose telephone number is (571)272-6040. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571)272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Erin M. File

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3.27.2005

STEPHEN CHIN
SUPERVISORY PATENT EXAMINER
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